



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
[www.uspto.gov](http://www.uspto.gov)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/495,552	02/01/2000	Robert L. Thornton	SIROS-99027A	5007
22887	7590	12/08/2003	EXAMINER	
			LE, KIMLIEN T	
		ART UNIT		PAPER NUMBER
		2653		B
DATE MAILED: 12/08/2003				

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>
	09/495,552	THORNTON ET AL.
	<b>Examiner</b>	<b>Art Unit</b>
	Kimlien T Le	2653

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) Responsive to communication(s) filed on 12 August 2003.
- 2a) This action is FINAL.                    2b) This action is non-final.
- 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) Claim(s) 1-5 and 22-35 is/are pending in the application.
- 4a) Of the above claim(s) 6-21 is/are withdrawn from consideration.
- 5) Claim(s) \_\_\_\_\_ is/are allowed.
- 6) Claim(s) 1-5,22,25-28 and 32-35 is/are rejected.
- 7) Claim(s) 23,24 and 29-31 is/are objected to.
- 8) Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) The specification is objected to by the Examiner.
- 10) The drawing(s) filed on \_\_\_\_\_ is/are: a) accepted or b) objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. §§ 119 and 120

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) All b) Some \* c) None of:  
1. Certified copies of the priority documents have been received.  
2. Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 13) Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.  
a) The translation of the foreign language provisional application has been received.
- 14) Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

#### Attachment(s)

1) <input type="checkbox"/> Notice of References Cited (PTO-892)	4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____ .
2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)	5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)
3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .	6) <input type="checkbox"/> Other: _____ .

**DETAILED ACTION**

***Response to Arguments***

1. Applicant's arguments filed on August 12, 2003 have been fully considered but they are not deemed to be persuasive.

Applicant asserts on page 3 :

"The LD and slider are two separate components attached to each other."

The Examiner maintains that Katagiri et al. (Optical heads based on coupled cavity laser diode) discloses an optical head apparatus comprising at least one solid state laser and an integral slider, the solid state laser and integral slider fabricated from a single, monolithic semiconductor substrate (Fig. 9. See also SPIE Vol. 2514/103).

Moreover, Applicant asserts on page 4 :

"Claim 22 recites to a "semiconductor substrate" including at least one "laser region" and a "slider region". In contrast to the present invention, Ukita et al. discloses on page 5561 an "integrated flying optical head.... That is, the LD and slider are two separate components attached to each other."

The Examiner maintains that Ukita et al. (Applications of an extremely short strong-feedback configuration of an external-cavity laser diode system fabricated with GaAS- based integration technology) discloses an optical head apparatus comprising at least one solid state laser and an integral slider, the solid state laser and integral slider fabricated from a single, monolithic semiconductor substrate (Fig. 5(a) and 6. See also Ukita et al., pages 5560-5561). Moreover, see Ukita et al. (Read/write performance and reliability of a flying optical head using a monolithically integrated LD-PD; page 3775, column 1, section D).

Furthermore, Applicant asserts on page 5 :

"As for claim 25, Ukita et al. does not disclose a semiconductor substrate having an air-bearing surface".

The Examiner maintains that Ukita et al. discloses a semiconductor substrate having an air-bearing surface (Fig. 5(a) and 6. See also Ukita et al. pages 5560-5561).

Also, Applicant asserts on page 5:

"As for claim 32, page 5557 of Ukita et al. does not disclose a laser including an emission facet having an aperture therein."

The Examiner maintains that Ukita et al. (Applications of an extremely short strong-feedback configuration of an external-cavity laser diode system fabricated with GaAS- based integration technology) discloses a laser including an emission facet having an aperture therein (Fig. 5(a) and 5(b), inherent).

#### ***Claim Rejections - 35 USC § 112***

2. Claim 28 recites the limitation "said second side electrical contact" in line 19 and "said first side electrical contact" in line 20. There is insufficient antecedent basis for this limitation in the claim.

#### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Art Unit: 2653

3. Claims 1-3 and 5 are rejected under 35 U.S.C. 102(b) as being anticipated by Katagiri et al. (Optical heads based on coupled cavity laser diode).

Regarding claim 1, see Figs. 9 and 10 of Katagiri et al. which show an optical head apparatus comprising at least one solid state laser and an integral slider, the solid state laser and integral slider fabricated from a single, monolithic semiconductor substrate (SPIE Vol. 2514/103).

Regarding claim 2, see Figs. 9 and 10 of Katagiri et al. which show an optical head apparatus comprising a single semiconductor substrate, the semiconductor substrate structured and configured to define at least one solid state laser and a slider, the solid state laser integral with the slider (SPIE Vol. 2514/103).

Regarding claim 3, see Figs. 9 and 10 of Katagiri et al. which show the optical head apparatus of claim 2, wherein the solid state laser includes an emission facet and the slider includes an air bearing surface, the emission facet substantially co-planar with the air bearing surface (SPIE Vol. 2514/103).

Regarding claim 5, see Figs. 9 and 10 of Katagiri et al. which show an integrated solid state laser and slider apparatus comprising a single, monolithic semiconductor substrate, the monolithic semiconductor substrate including a slider portion having an air bearing surface thereon, the semiconductor substrate including at least one laser portion having an emission face, the emission face substantially coplanar with the air bearing surface (SPIE Vol. 2514/103).

4. Claims 22, 25 and 32 are rejected under 35 U.S.C. 102(b) as being anticipated by Ukita et al. (Applications of an extremely short strong- feedback configuration of an external-cavity laser diode system fabricated with GaAS- based integration technology).

Regarding claim 22, see Figs. 5-10 of Ukita et al. which show a near-field optical apparatus comprising a monolithic semiconductor substrate, the semiconductor substrate including at least one laser region, the semiconductor substrate including a slider region, the laser region integral to the slider region, the integral laser region and slider region defining a monolithic optical head ( page 5561).

Regarding claim 25, see Figs. 5-10 of Ukita et al. which show a near-field optical apparatus of claim 22, wherein the slider includes an air bearing surface( page 5561).

Regarding claim 32, see Figs. 5-10 of Ukita et al. which show the near-field optical apparatus of claim 22, wherein the laser includes an emission facet having an aperture therein ( page 5557).

5. Claim 26 is rejected under 35 U.S.C. 102(b) as being anticipated by Ukita et al. (Read/write performance and reliability of a flying optical head using a monolithically integrated LD-PD).

Regarding claim 26, see Figs. 1, 15 of Ukita et al. which show the near-field optical apparatus of claim 25, wherein the air bearing surface comprising a protective layer of material ( pages 3770-3775).

Art Unit: 2653

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Katagiri et al. (Optical heads based on coupled cavity laser diode), and further in view of Thornton (U.S. Patent 5,978,408).

Regarding claim 4, see Figs. 9 and 10 of Katagiri et al. that show all the features of claim 2 except for the solid state laser that is a vertical cavity surface emitting laser. However, Thornton teaches that the solid state laser is a vertical cavity surface emitting laser (column 1, lines 14-20). Therefore, it would have been obvious to provide Katagiri et al. with the vertical cavity surface emitting laser by Thornton. The rationale is as follows: One of ordinary skill in the art at the time of the invention would have been motivated to provide Jain et al with the vertical cavity surface emitting laser as taught by Thornton in order to provide a highly compact VCSEL structure which can be used to define the lasting aperture of a laser structure.

7. Claims 33-35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ukita et al. (Applications of an extremely short strong- feedback configuration of an external-cavity laser diode system fabricated with GaAS- based integration technology), and further in view of Hopkins et al.(U.S. Patent 5,625,617).

Regarding claims 33-35, see Figs. 5-10 of Ukita et al. that show all the features of claim 32 except for the semiconductor laser having an output wavelength  $\lambda$ , and the aperture has a width w such that  $w < \lambda/2$ . However, Hopkins et al. teaches this matter (Abstract). Therefore, it

Art Unit: 2653

would have been obvious to provide Ukita et al. with the semiconductor laser having an output wavelength  $\lambda$ , and the aperture has a width  $w$  such that  $w < \lambda/2$  by Hopkins et al. The rationale is as follows: One of ordinary skill in the art at the time of the invention would have been motivated to provide Ukita et al with the semiconductor laser having an output wavelength  $\lambda/2$ , and the aperture has a width  $w$  such that  $w < \lambda/2$  as taught by Hopkins et al., such that the light emission is largely confined to a first region of the emission face.

8. Claim 27 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ukita et al. (Read/write performance and reliability of a flying optical head using a monolithically integrated LD-PD), and further in view of Polycarpou et al. (U.S. Patent 6,466,410).

Regarding claim 27, see Figs. 1 and 15 of Ukita et al. that show all the features of claim 27 except for the protective layer comprises a material selected from the group consisting of metal nitride, metal carbide, metal, metal alloy, Group III nitride, Group IV nitride, Group III carbide, Group IV carbide, diamond, diamond-like carbon, hydrogenated carbon, fluoride, and fluoropolymer. However, Polycarpou et al. teaches that the protective layer comprises a material selected from diamond-like carbon (column 5, lines 50-60). Therefore, it would have been obvious to provide Ukita et al. with the protective layer comprising a material selected from diamond-like carbon as taught by Polycarpou et al. The rationale is as follows: One of ordinary skill in the art at the time of the invention would have been motivated to provide Ukita et al with the protective layer comprising diamond-like carbon as taught by Polycarpou et al, in order to provide a smoother tribological interface to limit friction, wear and debris generation.

9. Claim 28 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ukita et al. (Applications of an extremely short strong- feedback configuration of an external-cavity laser

Art Unit: 2653

diode system fabricated with GaAS- based integration technology), and further in view of Wilde et al.(U.S. Patent 6,414,911).

Regarding claim 28, see Figs. 5-10 of Ukita et al. that show all the features of claim 28 except for a second side electrical contact and a first side electrical contact electrically accessible from a side of the optical head apparatus which is remote from the air bearing surface. However, Wilde et al. teaches a second side electrical contact and a first side electrical contact electrically accessible from a side of the optical head apparatus which is remote from the air bearing surface (column 8 , lines 50-60). Therefore, it would have been obvious to provide Ukita et al. with a second side electrical contact and a first side electrical contact electrically accessible from a side of the optical head apparatus which is remote from the air bearing surface. The rationale is as follows: One of ordinary skill in the art at the time of the invention would have been motivated to provide Ukita et al with a second side electrical contact and a first side electrical contact electrically accessible from a side of the optical head apparatus which is remote from the air bearing surface as taught by Wilde et al, in order to protect the head from being damaged.

*Allowable Subject Matter*

10. Claims 23- 24 and 29-31 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

11. The following is an examiner's statement of reasons for allowance:

In claim 23, the limitation of the near-field optical apparatus having the monolithic semiconductor substrate further comprises: a first conductivity-type semiconductor layer

Art Unit: 2653

adjacent a first side of the semiconductor substrate; an first conductivity-type distributed Bragg reflector mirror stack adjacent the first conductivity-type semiconductor layer; a multiple quantum well active region layer adjacent the first conductivity-type distributed Bragg reflector mirror stack; a second conductivity-type distributed Bragg reflector mirror stack adjacent the multiple quantum well active region layer; an insulating layer adjacent the second conductivity-type distributed Bragg reflector mirror stack; and a metal layer adjacent the insulating layer, taken in conjunction with the limitations of claim 22, is not anticipated by, nor made obvious, over the prior art of record.

*Point of Contact*

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kimlien T Le whose telephone number is 703 305 3498. The examiner can normally be reached on M-F 8a.m-5p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, William Korzuch can be reached on 703 305 6137. The fax phone numbers for the organization where this application or proceeding is assigned are 703 872 9314 for regular communications and 703 872 9314 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703 305 3900.

Kimlien Le  
December 2, 2003

*William Korzuch*  
WILLIAM KORZUCH  
SUPERVISORY PATENT EXAMINER  
TECHNOLOGY CENTER 2600